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ABSTRACT

This paper begins by describing the changing needs in the education of today's information technology (IT) professional. It presents a theoretical framework for using an experiential learning approach in the context of professional education in IT and information management and describes an instructional model that augments the principles of experiential learning with principles drawn from task motivation, Total Quality Management (TQM), and service learning. The paper concludes with an example of the application of and benefits from the model--a successfully implemented IT professional education program which centers on experiential learning activities that provide technology-related services to the not-for-profit community. The program highlighted is the Center for Active Learning (CAL) at Syracuse University (New York). Program objectives, CAL's core functions, Project CORE (COmputer REuse), other CAL projects, and participation in CAL are described. (Contains 43 references.) (Author/MES)

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THE EDUCATION OF IT PROFESSIONALS: INTEGRATING EXPERIENTIAL LEARNING AND COMMUNITY SERVICE

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This paper begins by describing the changing needs in the education of today's IT professional. It presents a theoretical framework for using an experiential learning approach in the context of professional education in IT and information management and describes an instructional model that augments the principles of experiential learning with principles drawn from task motivation, Total Quality Management (TQM), and service learning. The paper concludes with an example of the application of and benefits from the model---a successfully implemented IT professional education program which centers on experiential learning activities that provide technology-related services to the not-for-profit community.

INTRODUCTION

With the establishment of universities in thirteenth century Europe, a parallel education track, separate from the existing apprenticeship system, developed. This type of education adhered to the "empty vessel" metaphor (i.e. the student as passive recipient of knowledge), an approach still followed in many of today's schools and universities.

The relatively slow expansion of knowledge made this a reasonable approach in the past. It was realistic to expect that students could graduate with a thorough grounding in the theory of their profession, enter practice with an established organization, and learn their field under the tutelage of an experienced professional. Today this paradigm is not a realistic response to the demands of many fields, including the information professions.

In this paper we describe changing needs in IT professional education and present a theoretical framework for implementing experiential learning activities into professional educational programs in IT and information management. We then describe an instructional model that augments the principles of experiential learning with principles drawn from task motivation, Total Quality Management (TQM), and service learning. We conclude with an illustration of the application of and benefits from the model---a successfully implemented IT professional education program which combines experiential learning and service to the not-for-profit community.

IT PROFESSIONAL EDUCATION

Rapid technological advances and the concomitant expansion of research and knowledge have forced specialization upon the professions and continuing education a critical requirement for professionals. Graduates entering professional life are expected to "hit the ground running", capable of working individually or in teams to immediately apply their theoretical knowledge to solve real problems. Today, more than ever, employers are seeking workers who (1) possess problem solving and reasoning abilities, (2) can listen and respond to customer concerns, (3) can make decisions and develop innovative

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solutions, (4) are goal-directed, and (5) can work in teams (Parnell, 1990; Carnevale, Gainer, and Meltzer, 1988). In the field of information management, there is an unprecedented demand for trained professionals that have both a general theoretical grounding in the technology of information management, and proven ability in the application of book knowledge to practical problem solving.

Compounding the challenge of meeting this demand is the rapid rate of change in the field and the broad range of commercial off-the-shelf (COTS) solutions available in an information systems and telecommunications (hereafter IT) environment characterized by two influential paradigms: client/server computing and open systems. While these two paradigms, which are inter-connected and interdependent in significant ways, have helped make IT solutions to a large extent interoperable and affordable, they have also complicated the process by which IT solutions are identified and adopted by customers.

Before client/server computing and open systems, the decision-maker had to pick and choose from a limited set of IT options, most were proprietary in nature. Typically, the vendor offered complete solutions, and once the decision had been made by the customer, the vendor was brought in for the implementation. Under the new paradigm, the customer is faced with a wide range of IT choices and strategies, which often promise competing approaches to solving a problem or meeting a need. For example, a customer contemplating a move to a local area network-based operating environment has to consider whether to implement the solution using a fat or thin client, a peer-to-peer or server-based network operating system, a conventional or wireless communications system, a high-end or low-end hardware platform, and whether to pick an enterprise-wide solution or something smaller in scope. Increasingly, customers are assembling a solution using components from different vendors, with an eye toward price, robustness, support and scalability.

Under this new paradigm, IT professionals are being asked to take on the role of consultant (internally or externally) to help customers make the right choices from the welter of options available to them. Pre-professional students must be exposed to learning activities that require them to actively interpret, integrate and apply the knowledge, skills, and attitudes they learn to real-life settings.

Although many of today's pre-professional students typically graduate with a solid theoretical knowledge, they often lack experience in applying that knowledge to solve real problems in real settings. The traditional passive approach to professional education has produced graduates with the problem-solving skills and attitudes required for (1) understanding and applying concepts and principles learned and (2) successful professional practice. A balanced approach that integrates theoretical knowledge with real-world experiences would likely improve the overall readiness of these fledgling professionals. Ideally, this approach would provide students with the supported learning environment of an apprenticeship, where an experienced and knowledgeable professional provides help and guidance and the student solves real problems for real clients. This is the paradigm of experiential learning.

THE THEORETICAL BASES OF EXPERIENTIAL LEARNING

The terms "active learning" and "experiential learning" are often used interchangeably in the literature to refer to the use of direct experience to instruct students in applying methods and theories learned in the classroom. Drueke (1992) defines active learning in terms of active participation or student involvement that results from a variety of teaching techniques. Active learning encompasses a broader range of potential activities from in-class discussions and interactive exercises to out-of-class internships and fieldwork, including experiential learning environments that focus on hands-on activities or place the student in real or simulated problem situations that require resolution. Keeton and Tate (1978) describe the experiential learner as one who is directly in touch with the realities of that being studied, as opposed to learning in the abstract. Wagemans & Douchy (1991) describe two types of experiential learning: (1) prior learning (knowledge and experience gained outside the classroom that the student brings to the learning situation) and (2) sponsored learning (knowledge and experience gained throughout the learning situation, planned and supervised by the instructor but occurring outside the classroom).

Perhaps the most widely published work on experiential learning is that of David Kolb. Kolb, building largely on the theories of Dewey (e.g. 1938), Lewin (e.g. 1935), and Piaget (e.g. 1929) and focusing on the adult learner, defines learning as "the process whereby knowledge is created through the transformation of experience" (1984, p. 38). He defines experiential learning as the process that links education, work, and the personal development of the learner: "(k)nowledge does not exist solely in books, mathematical formulas, or philosophical systems; it requires active learners to interact with, interpret, and elaborate these symbols" (Kolb, 1984, p. 121). The basis,

therefore, of experiential learning is the recognition that learning takes place everywhere, not only in the classroom.

Kolb describes learning in terms of a four-stage cycle that progresses from concrete experience to reflective observation to abstract conceptualization to active experimentation which then leads to subsequent concrete experience, and so on. In the concrete experience stage, the learner is actively involved in a formal or informal learning event. During the reflective observation stage, the learner thinks about, questions, sorts out, clarifies, and classifies the events of the concrete experience stage (Thatcher, 1990). The learner then begins to transform these reflections into abstract ideas which are "stored" in the mind for future use (Thatcher, 1990). The final stage, active experimentation, requires the learner to draw upon this store of abstract ideas to apply in a new learning experience. The learner may enter the cycle at any point but Kolb maintains that every learning experience must involve all four stages. Usher (1985) further claims that the learner does not progress through these stages spontaneously but rather requires guidance from an instructor.

Progress within these learning modes results in increasingly complex learning environments. Affectively complex learning environments emphasize experiences that exemplify "what it is actually like to be a professional in the field under study" (Kolb, 1984, p. 198). Behaviorally complex learning environments emphasize actively applying knowledge or skills to a practical situation. Perceptually complex learning environments emphasize relationships between conceptual understanding, information seeking, and problem solving. Symbolically complex learning environments are characterized by applying abstract reasoning to complex problems.

Although strongly supported in the literature, Kolb's ELT is not without its critics. Hopkins (1993) argues that Kolb's approach is not based on any coherent theory of experience. Jarvis (1992) has pointed out that, contrary to ELT's central tenet, not every experience yields learning. Merriam and Clark (1991) argue that persons learn from experience only when that experience is attended to, is reflected on, and has personal impact. Merizow (1991) has argued similarly, noting that active reflection, as opposed to passive observation or non-reflective experimentation, is essential before individuals can benefit from experience; otherwise, no learning will occur. Clark and Wilson (1991) criticize ELT's relative neglect of the social and cultural context within which experiential learning takes place, arguing that ELT's exclusive emphasis on human agency without the context of learning is short-sighted.

We believe that Kolb's ELT is valuable in the context of higher education, and particularly in the professional education of information managers and technologists. However, we believe that Kolb's ELT needs to be augmented with two important features before its value for IT professional education can be fully realized. These two features, which we have incorporated into our successful implementation of active learning (described below), are: (1) an identifiable customer for the deliverables resulting from the active learning experience, and (2) an identifiable product which provides the task context for the active learning experience. Both these features enhance the motivational benefits of ELT to the student – a perspective that appears to be overlooked in discussions of ELT processes and impacts; for example, the focus of most evaluative studies of ELT on students in higher education is on cognitive benefits and on self-efficacy, not motivation. We believe that active learning experiences that result in an identifiable deliverable for an identifiable customer are more motivating and more satisfying to the student than those that do not.

Both features have theoretic merit. Several writers on Total Quality Management (TQM) principles have noted the powerful motivational impetus provided by an identifiable customer (primary customer) who receives the deliverables and to whom suppliers are accountable (e.g., Wood, Hull & Azumi, 1983). Award-winning TQM programs like those of Xerox emphasize customer-oriented effort as a fundamental and central tenet (Venkatesh et. al., 1996). The nature of the deliverable itself has been studied within the framework of task motivation (Hackman & Oldham, 1980). Tasks that (1) result in a complete product (as opposed to only a part of a larger product), (2) call for skill variety, (3) provide immediate feedback, (4) have significance, and (5) are divisible promote higher levels of motivation relative to tasks that lack one or more of these dimensions (see Hackman & Oldham, 1980). To the best of our knowledge, these two features have not been considered under ELT. Our end-of-semester evaluations show that students consistently report high levels of motivation and satisfaction stemming from these two features.

EXPERIENTIAL LEARNING AND IT PROFESSIONAL EDUCATION

It is surprising that experiential learning appears to be

neglected in recent discussions of required IT/IS skills and the extent to which higher education is equipping students with these skills. A joint industry/academic study found that industry now demands IS professionals with knowledge and skills in technology, business operations, management, and interpersonal skills with an end-user-focus (Lee, Trauth and Farwell, 1995).-"...(U)niversities must be more innovative in designing their IS programs in order to add breadth, depth, and relevance to the curriculum" (p. 334). However, this study ignored the key role experiential learning opportunities can play in upgrading the relevance of IT/IT curricula. Reviews of pedagogical approaches in IS/IT (e.g., Leidner & Jarvenpaa, 1995) have also neglected the role of experiential learning, despite the strong practitioner foundations of the discipline.

In a review of active learning research, Hendrickson (1984) found that active learning techniques were highly effective in higher educational settings. In an early examination of professional programs and their foci in several disciplines, including management, Schein (1972) identified several problems, noting that professional programs (1) focused on organizational needs and largely ignored user needs, (2) provided almost no training/opportunities to students to work in teams engaging complex social problems, (3) included little instruction in diagnosing and managing client relationships, and (4) failed to include ethical and value issues. Improvements have occurred in a few of the areas identified in Schein's analysis. Professional programs which "focus on the integration of basic science, applied skill training, and practical experience and which permit an interdisciplinary focus on client problems are essential if clinical practicum work is to become more innovative and effective" (Schein, 1972, p. 119).

In our experience, experiential learning programs sensitive to the motivational needs of student learning and designed to serve the community via student involvement in team projects can be very effective in combining rigor and relevance, cognitive and motivational gains, business values and community service values of sharing and cooperation, action and reflection. A number of experiential learning activities that bridge the gap between theory and application may be found in professional education. Examples are internships, simulations, case studies, mentoring programs, apprenticeships, and cooperative education programs. These activities allow practical applications of the abstract concepts and processes learned in the classroom and offer several advantages: (1) colleges can gain private sector support for active learning programs; (2) students practice technical skills while learning specific applications; (3) students gain increased employment opportunities; and (4) industry benefits with future employees with ready-made competencies (Leitzel, 1995).

EXPERIENTIAL LEARNING AND COMMUNITY SERVICE

A renewed spirit of volunteerism and community service has been advocated from leaders in business and industry, education, and government; service learning initiatives are permeating educational programs from middle schools to graduate schools (Slavin, 1996). "Service learning" is a type of active learning focused on learning while serving in the community. "Service learning involves students in real-life settings where they apply academic knowledge and previous experience to meet real community needs" (Fertman, 1994, p. 8). The term service learning can be loosely defined as an educational activity, program, or curriculum that seeks to promote student learning through experiences associated with volunteerism or community service. Successful service learning is based on active learning, which is characterized by very different behaviors on the part of both teachers and students.

Experiential learning initiatives can provide a critical complement to classroom learning, increasing students' understanding, confidence, and problem-solving skills, and enabling them to take risks and be change agents in their organizations (Kolb, 1984). Combining active learning experiences with a community service context not only promotes the student's intellectual development but also his/her social/moral development because it (1) enhances classroom instruction through real-life experience, (2) reinforces the concept of service-learning and the values inherent in community service, and (3) reinforces the values inherent in sound business practice (e.g. customer orientation, effective leadership, teamwork, professionalism). Furthermore "(a) good service learning program helps participants see their questions in the larger context of issues of social justice and social policy---rather than in the context of charity" (Kendall in McDaniel, 1994, p. 29). For example, some law schools send students out into the community to work with social service agencies, thereby providing students with a rich personal experience while making a meaningful contribution to society (Slavin, 1996).

Zucca, Freund and Wollesen (1993) assert that experiential learning activities provide a deeper, more purposeful, thoughtful, and value-oriented participation in public life. Fertman (1994) advocates (1) the integration of service learning into the curriculum, (1) service

learning should earn college credit and (3) teaming students with experts in a field and having them work together on real projects as one of the best ways to learn. Students have been found to develop empathy for the people with whom they work and thus reduce stereotypical views and social distance. Students also enhance their sense of responsibility. Students seem to develop more complex ways of analyzing a problem as a result of service learning courses. When service learning projects are of value to community clients and are rooted in the subject matter, students show greater mastery of the conceptual material than when the projects do not have these characteristics. Few evaluative studies have found it important to examine the motivational benefits to students from experiential learning. As argued above, the TQM and task motivation literatures point out that undertaking a consequential task with real deliverables for a real customer is a key motivator. In light of this, the neglect of motivation in explaining the benefits from experiential learning to the student is surprising, given the key role played by motivation in cognition and learning (e.g. Ames and Ames, 1989).

EXPERIENTIAL AND SERVICE LEARNING IN AN IT PROFESSIONAL EDUCATION PROGRAM

Many authors recognize the value of IT in the non-profit sector. For example, Henderson (1985) points to the efficiency and effectiveness gains from IT use, enabling non-profits to provide better services, while Zeff (1996) argues the value of access to the World Wide web for more effective fund-raising. Others have talked about improved financial management (Gelatt, 1992; Young, 1994), improved communications and information access (Duronio & Loessin, 1993), and improved ability to deal with change (see Drucker, 1989). However, non-profits generally appear to face several impediments to using IT effectively. A recent survey reported that more than 70 per cent of the agencies surveyed did not have access to a technical consultant to help them plan for and deploy IT (Williams, 1990; see also "How you and other non-profits are using technology: latest survey results", 1996). Lack of training opportunities in IT (Williams, 1990), lack of awareness about IT's importance (see Beckley et al., 1996), lack of funding, leading to dependency on donations of IT equipment, which in turn leads to an ad hoc IT environment characterized by systems integration challenges, costly maintenance, and challenges in standardization (see Beckley et al., 1996; Overman, 1990).

Overall, while IT has revolutionized work in modern organizations, this revolution has yet to penetrate the non-profit sector. This is particularly true of the smaller non-profits. Typically, non-profit agencies are underfunded and understaffed, their employees generally lack technical expertise, their access to computer resources is severely limited and their need for those resources is profound, and opportunities for affordable technology procurement, training, and consultation are rare. Scholars have indicated the difficulty in defining the term "non-profit organization (Anheier, 1995; Overman, 1990; Hall, 1994; Gelatt, 1992). We adopt the following working definition, which corresponds to that used in most state statutes: "A non-profit organization is an organization whose goal is something other than earning a profit for its owners. Usually its goal is to provide services" (Anthony & Young, 1990, p. 216). From this definitional perspective, we include human and health service agencies, K-12 schools, school-to-work programs and adult education agencies, government agencies, law enforcement, and arts and cultural entities such as museums.

Key success factors in introducing IT into the non-profit sector are no different from when the for-profit sector is the target: careful planning, monitoring, and evaluation of the implementation effort. Specific needs include analysis of client's objectives, needs and resources, assessment of technology solutions available in the market, solution design and development, implementation (including end-user training) and both formative and summative evaluation. The key difference, of course, is that the non-profit sector is resource-constrained in a way that the for-profit sector.

THE CENTER FOR ACTIVE LEARNING AT SYRACUSE UNIVERSITY

Syracuse University's mission---to create a student-centered educational environment within the context of a major research university---focuses on five core values of quality, caring, diversity, innovation, and service. Community outreach and active learning which goes beyond the classroom are emphasized as teaching and learning goals.

The School of Information Studies at Syracuse University offers high quality, innovative, interdisciplinary academic programs in information and library science, telecommunications and network management, and information resources management. The School's user-centered focus advocates the integration of classroom

instruction, technology applications, and real-world experiences into an interdisciplinary educational environment. This integration is operationalized by the School's Center for Active Learning, which was established in early 1997 with corporate support.

The Center for Active Learning (CAL) incorporates the School of Information Studies' focus on users and user information needs and serves the spirit of community service. CAL was established to help non-profits, especially the smaller non-profits, meet these IT challenges by providing IT consulting and related services free of charge to the client.

CAL is based on the following simple yet profound concepts:

- The holistic development of the student is paramount.
- Service learning enriches the community, enriches the learning experience, and benefits the university.
- Active learning is an important component of a balanced curriculum.

CAL is focused on meeting the IT needs of non-profit agencies of central New York State by incorporating public and community service activities into the learning experiences of students. CAL promotes the value of community service as an integral part of the educational experience by providing (1) IT consulting and related services, and technology transfer services free-of-charge to non-profit agencies in the community, (2) active learning experiences to students, (3) course and curriculum development services to faculty and (4) research and evaluation information to the field.

CAL's active learning experiences are designed to promote the holistic development of the School's undergraduate and graduate students. Its primary learning objectives are (1) to help students develop the conceptual and practical skills needed to be informed consultants and leaders of IT and managers of technology transfer and (2) to foster students' attitudes of service and volunteerism. It allows students to see a direct benefit of their contribution, to follow a project through from conception to implementation, and to work collaboratively with clients, faculty and peers. The primary vehicle for achieving these learning objectives is the field consulting project (taken for course credit) where students work in small consultant teams to provide clients with a completed product or service that resolves a IT problem or addresses an opportunity. The broad range of IT consulting and related services provided by CAL to clients include:

- hardware and software evaluation, selection, and installation.
- network planning, design and installation.
- database design and development.
- Web page design and development.
- end-user training.
- strategic planning.
- procurement and vendor selection.
- community needs assessment.

CAL taps the power of experiential learning in the context of community service to benefit the student, the client and the community at large through its five core functions. These are:

- Community Outreach. Via the semester-long field consulting project, student consulting teams provide clients with a completed product designed to resolve a problem or address an opportunity. CAL's technology transfer function is also a part of this.
- Hands-on Experience. The field project provides students with hands-on consulting experience in the context of real problems faced by real clients. In addition, CAL's Business Applications Educational Lab (called the BAE Lab) provides an experimental setting to promote learning-by-doing.
- Software Simulation. The BAE Lab features network planning and design decision aids, notably simulation software. Training on such aids enables students to present clients with thoroughly researched and well-documented design recommendations.
- Faculty and Curriculum Development. CAL seeks to enrich the teaching/learning process by facilitating the integration of active learning and community service strategies into a broad range of courses in the School of Information Studies and by promoting continuous improvement of such strategies via research.
- Research and Information Dissemination. CAL promotes research into active learning and the development of a case study base, serving as a forum for archiving and sharing information in support of community-wide benchmarking, and the refinement of a replicable model of a higher education-community partnership initiative.

By participating in CAL's projects, students have the opportunity to learn by doing in a low risk, supported environment. Faculty have an opportunity to enrich theories and concepts taught in the classroom through real-life examples and experiences. Non-profit clients receive free IT consultation and training from competent, knowledgeable and highly motivated students, who see

themselves as consultants in training. The university strengthens its relationship with the community. CAL's corporate sponsors receive positive publicity and help fulfill their community service initiatives. The latter is frequently accomplished through CAL's Project CORE.

CAL'S PROJECT CORE

CAL's Project CORE (standing for COmputer REuse) seeks computer donations from the corporate sector to be given to non-profit agencies. In addition to the material benefits to the recipient, students are providing a broad range of value-added services that include:

- cleaning hard disks and readying donated computers for use.
- listing and explaining each computer's capabilities.
- researching and recommending ways to upgrade processor performance and strategies for memory, storage and BIOS upgrades, including vendor and pricing information and procurement options.
- recommending ways to use computers in a local area network (LAN) and to access the World Wide Web.

Project CORE (student) staff work in conjunction wth CAL to design and deliver a total solution to the client: that is, the consulting and end-user training services augmented with actual implementation of the solution by CAL teams, using Project CORE computers. Over fifty computers have been donated under Project CORE since last October. In the spring of 1998, Project CORE launched an ambitious program of donating 1,000 additional computers to the non-profit sector in the community by the year 2000. We are calling this Project CORE's 1000 by 2000 goal.

OTHER CAL PROJECTS

CAL has initiated a number of other projects that provide support to its main objectives. These include:

- serving as a test-bed for advanced technologies, such as asymmetric digital subscriber line (ADSL).
- sponsoring a colloquium that brings together all of CAL's major partners (faculty, students, not-for-profit agencies, corporate sponsors) to explore various topics of interest.
- developing a database management application to track information (including evaluation data) pertaining to clients and projects.
- developing a document database to organize the over 100 case studies and related materials generated by CAL's student teams.
- growing the BAE Lab into a exciting studio environment for team-based learning-by-doing.

PARTICIPATION IN CAL

Students can work on CAL projects in two ways: enroll in courses that require students to work in interdisciplinary teams on CAL class projects, and/or work on CAL special projects through independent study, internship opportunities, or simply as interested volunteers. Over the past several years, over a hundred IT class projects for clients in the community have been completed through courses in telecommunications projects, local area networks, systems analysis, end-user training, project management, and database management. Interested faculty have redesigned their courses to incorporate CAL-related projects; i.e. projects focusing on (1) IT consulting: helping clients determine their hardware and software needs, and with procurement, implementation and use issues, (2) actual implementation and testing of solutions, or (3) end-user training. Two examples of "CAL courses" are briefly described below.

"Telecommunications Projects," offered at both undergraduate and graduate levels, is primarily an IT consulting course with a focus on IT infrastructure issues. This course is the vehicle through which CAL vision was initially tested in 1991. The major course assignment is the field project assignment. Students working in small teams provide consulting and related services to an identifiable real client, in the context of a project topic they pick to work on. Student team reports for the assignment are required to be organized under two broad components: planning and design. Under planning, students analyze user requirements, constraints (budgetary, physical etc.), organizational objectives, and the technical and human resources infrastructure. Armed with this knowledge, student teams research available technology solutions and options in the marketplace and recommend a cost-effective solution to the client. Student teams have to not only recommend a solution, but they have to defend their choice in the report, and provide complete pricing and vendor information in appendices. Increasingly, repeat clients have needed actual implementation services combined with the consulting and related services.

End-of-semester student evaluations have been very positive, emphasizing the motivational advantages of working on a real, consequential project for a real client that really needs help. Project topics have covered a wide range: telecommunications planning and design, systems and network integration, office automation, Intranet

design and development, communications services for remote access, and Internet access design options. Close to 35 non-profit agencies have served as clients to this class alone in the past several years.

"Instructional Strategies and Techniques for Information Professionals" is a graduate-level elective course in the School of Information Studies. It is particularly relevant to those who intend to enter a career field in which education or training is an important and/or major function (e.g. information systems coordinator, school librarian). The integration of students from the School's various graduate programs assures a rich synthesis of perspectives encompassing service, management, and technology.

The course purposefully integrates all four types of Kolb's (1984) complex learning environments. Students are teamed with local non-profit organizations to meet their specific training needs. In the classroom, students gain a solid foundation in the theory and methods of designing, implementing, and evaluating instructional presentations and materials, as well as opportunities to practice methods and skills through in-class exercises with instructor and peer feedback. Students must analyze the complex training needs of their clients and develop viable solutions. Out of class, student teams are required to meet with clients to assess technology training needs, design appropriate training interventions and evaluation mechanisms, deliver one or more training sessions, and create related support materials (training manuals, job aids). Often, the projects provide follow-up to previous CAL projects in which student teams selected and installed software.

The instructor of this course fulfilled the two roles specified by Kolb (1984): (1) teacher of essential concepts and techniques and (2) facilitator, providing a learning framework through informal meetings and classroom seminars. Some examples of student projects are:

- instructing the staff of a child care agency how to use a newly installed email system .
- training social workers from the country health department how to create and use spreadsheets.
- teaching teachers from a local school district how to design web pages.
- Introducing a set of new medical databases to employees of a not-for-profit teaching hospital.
- training staff of a school for the arts on the use and application of presentation software.

In the fall of 1997, 24 students enrolled in this course. Seven non-profit agencies in need of technology training addressed students during the first class session. Students selected the agency with which they would like to work, creating teams of 2-4. A pre-project questionnaire administered at the beginning of the course determined that most (17; 81%) students expected to have experiences working with real people and solving real-world problems and expected to find the experience personally satisfying and fun. The two major concerns voiced by students were (1) a lack of balance of effort put forth by each team member (13; 62%) and (2) time/scheduling of team meetings and training sessions (10; 48%). In order to address these concerns, the instructor (1) regularly monitored each team member's participation throughout the semester and factored participation into each student's final course grade and (2) allocated a portion of class time for team meetings.

A post-project questionnaire revealed that all students (24; 100%) believed the experiential approach enhanced their learning and that they had achieved their personal learning goals. Their biggest problem (10;42%) had been in communication with the client (e.g. some clients did not return phone calls, meeting times were suddenly changed), a real-world problem facing by consultants in most fields.

Sixteen students (67%) felt participation in these projects increased their interest in community service. Examples of student comments are:

- "It gave me a way to learn more about and work with an organization that has held much interest for me professionally."
- "It's nice to feel like you're giving something back to the community---especially since many times they would have trouble affording training from a 'professional' organization."
- "Working with people who had a real need and knowing I was providing a service rather than just completing a project for a grade made this experience much more meaningful."

Clients were asked about their satisfaction with the results of the projects. All clients (7; 100%) stated their expectations had been met or exceeded.

Both of these experiential learning examples successfully addressed the two important motivational features described earlier. They (1) are customer-oriented, focusing on and satisfying a real need and (2) result in a completed, significant product.

CONCLUSION

It has been said that the "paradigm that is likely to characterize college classrooms of the future envisions a place where quality and mastery are the reigning values, where students work harmoniously with classmates and professors toward shared goals, and where professors are guides and mentors to students who are applying their learning in a variety of "real world" contexts and are evaluated by the products of their work" (McDaniel, 1994, p. 30). The incorporation of experiential learning via team-based project work into professional education programs gives students opportunities to apply theoretical knowledge and practical skills learned in the classroom to solve real-world problems. Experiential learning projects that serve the IT needs of the non-profit sector help develop students' attitudes of community service, build teaming skills, and foster a spirit of volunteerism, besides addressing a key lacuna in the non-profit sector.

CAL offers a theoretically grounded program to incorporate experiential learning into professional higher education, and augments ELT with two important motivational principles: one centering on the customer, and the other on the deliverable. Howe (1997) observes that "to change from passive to active learning...is very difficult, for both students and teachers because the ruts they are in are familiar and comfortable". It is important to keep the motivational aspect of instruction and learning in view in light of the novelty of active learning, which may initially deter students. CAL represents a successful initiative designed to realize the vision of the professional school of the future, and offers a viable model for integrating classroom learning, IT, real-world experience, and community service to promote the holistic development of the student.

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